

REEVALUATION OF AYLACOPHORA AND PALEAEPAPPUS (ASTERACEAE: ASTEREAEE)

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ABSTRACT

Nardophyllum deserticola (Cabrera) Nesom and *Nardophyllum patagonicum* (Cabrera) Nesom are two endemic species from Argentinean Patagonia that were originally described under the monotypic genera *Aylacophora* and *Paleaepappus* in 1953 and 1969, respectively. In 1993, Nesom included *Aylacophora* and *Paleaepappus* within the genus *Nardophyllum*, arguing that the discontinuities between the paleaceous pappus of *Aylacophora* and *Paleaepappus* and the pappus bristles of *Nardophyllum* do not justify considering them as distinct genera. Careful observation of the herbarium material revealed that: 1) the pappus of *N. deserticola* and *N. patagonicum* consists of ca. 10 linear-elliptic paleae, while in remaining *Nardophyllum* species, the pappus is composed of ca. 30 bristles, and 2) the receptacular paleae of *Nardophyllum deserticola* and *Nardophyllum patagonicum* are wide and enclose the florets, while in *Nardophyllum* species, the paleae, if present, are narrow and do not enclose the florets. These observed discontinuities between *N. deserticola* and *N. patagonicum* with respect to the rest of *Nardophyllum* do support the consideration of both species as to two distinct monotypic genera, *Aylacophora* and *Paleaepappus*, respectively.

RESUMEN

Nardophyllum deserticola (Cabrera) Nesom y *Nardophyllum patagonicum* (Cabrera) Nesom son dos especies endémicas de la Patagonia argentina que fueron originalmente descritas bajo los géneros monotípicos *Aylacophora* y *Paleaepappus* en 1953 y 1969, respectivamente. Posteriormente en 1993, Nesom incluyó *Aylacophora* y *Paleaepappus* dentro del género *Nardophyllum* argumentando que las discontinuidades entre el papo paláceo de *Aylacophora* y *Paleaepappus* y el papo piloso de *Nardophyllum* no justifican considerar a éstos como géneros independientes. La observación detallada

del material de herbario reveló que: 1) el papo de *N. deserticola* y *N. patagonicum* consiste en ca. de 10 páleas linear-elípticas, mientras que en el resto de las especies de *Nardophyllum*, el papo está compuesto por ca. 30 cerdas y 2) las páleas del receptáculo de *Nardophyllum deserticola* y *Nardophyllum patagonicum* son anchas y abrazan las flores, mientras que en el resto de las especies de *Nardophyllum*, las páleas, si están presentes, son más angostas y no abrazan las flores. Las discontinuidades observadas entre *N. deserticola* y *N. patagonicum* con el resto de *Nardophyllum* apoyan la consideración de ambas especies como dos géneros monotípicos independientes, *Aylacophora* y *Paleaepappus*, respectivamente.

Endemic to Argentinean Patagonia, *Nardophyllum deserticola* (Cabrera) Nesom and *Nardophyllum patagonicum* (Cabrera) Nesom are 2 of the 10 species recognized inside *Nardophyllum* Hook. & Arn. by Nesom (1993).

Nardophyllum deserticola and *N. patagonicum* were originally described by Cabrera under the monotypic genera *Aylacophora* and *Paleaepappus*. *Aylacophora* (Cabrera 1953) was characterized by its paleaceous receptacle, scaly pappus, and compressed cypselae with 2(-3) ciliate ribs. *Paleaepappus* (Cabrera 1969) was defined by its paleaceous receptacle and its pappus of 7-8 paleae. In contrast, *Nardophyllum* sensu Cabrera (1954) has receptacles naked or with only 3-6(-13) paleae, a pappus of bristles, and terete, more or less pubescent cypselae.

According to Nesom, the discontinuities between the paleaceous pappus of *Aylacophora* and *Paleaepappus* and the bristles of *Nardophyllum* pappus do not support their distinction from *Nardophyllum* because there is a tendency for the pappus bristles to be somewhat flattened in *Nardophyllum*.

However, according to our observations and the interpretation of the data gathered (see below), *Aylacophora* and *Paleaepappus* should be considered as independent genera from *Nardophyllum* as follows:

Aylacophora Cabrera, Bol. Soc. Argent. Bot. 4:266. 1953. TYPE SPECIES: *Aylacophora deserticola* Cabrera, Bol. Soc. Argent. Bot. 4:268. 1953. *Nardophyllum deserticola* (Cabrera) Nesom, Phytologia 75:362. 1993. **Fig. 1 A-D**. TYPE: ARGENTINA. PROVINCIA NEUQUÉN: Plaza Huincul, 12 Apr 1952, A.L.Cabrera 11053 (HOLOTYPE: LP!; ISOTYPE: US!).

Shrub 50 cm high, densely branched; old branches aphyllous, bearing furrows; new branches with sparse nodes; leaves linear; capitula discoid, solitary at ends of branches; involucre globose; receptacles paleaceous, paleae wide, apically pubescent, each palea enclosing a floret; cypselae compressed, 2(-3) nerved, pubescent only on the ribs; pappus of 10-11 oblong scales no longer than 1.2 mm, in 1 series.

Ecology.—*Aylacophora deserticola* inhabits semidesert areas in Patagonia. The very few herbarium specimens of this species lead us to regard them as very narrowly distributed. According to Ing. Steibel (pers. comm.), *A. deserticola* Cabrera grows on edaphic communities in the Monte biogeographic province (Cabrera & Willink 1973), where it is present on sand dunes with very sparse shrub cover, associated with *Larrea divaricata*, *Atriplex lampa*, *Prosopis flexuosa*

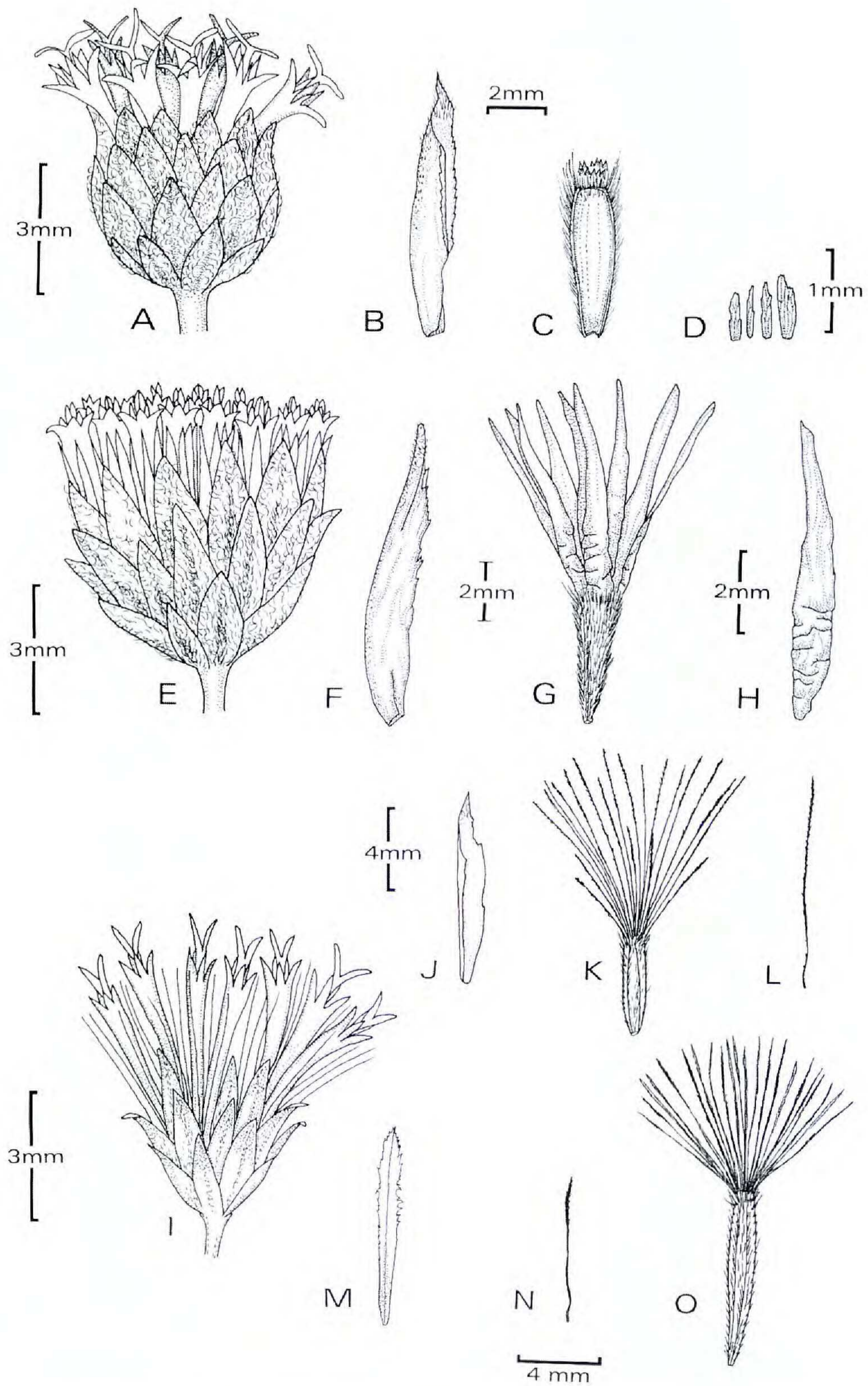


FIG. 1. **A–D**, *Aylacophora deserticola*. **A**. Capitulum. **B**. Receptacular palea. **C**. Cypsela. **D**. Pappus scales. **E–H**, *Paleaepappus patagonicus*. **E**. Capitulum. **F**. Receptacular palea. **G**. Cypsela with pappus. **H**. Pappus palae. **I–L**, *Nardophyllum bracteolatum*. **I**. Capitulum. **J**. Receptacular palea. **K**. Cypsela with pappus. **L**. Pappus bristle. **M–O**, *Nardophyllum bryoides*. **M**. Receptacular palea. **N**. Pappus bristle. **O**. Cypsela with pappus. (**A–D**, based on *Cabrera 11053*, LP; **E–H**, based on Rio Chico, 1900, *Ameghino s.n.*, LP; **I–L**, based on *Serra 77*, LP; **M–O**, based on *Ruiz Leal 27011*, LP)

var. *depressa*, *Senna aphylla* subsp. *divaricata*, *Chuquiraga erinacea*, *Gutierrezia solbrigii*, *Fabiana patagonica* and *Larrea cuneifolia*. *Aylacophora deserticola* has been collected in Argentina, Prov. Neuquen, Dptos. Confluencia, Cutralc6, Añelo, Pehuenches, and Zapala. West of Río Covunco and south of Río Neuquén in Dpto. Zapala, *A. deserticola* is the dominant species regarding surface cover. Flowering in the fall.

Paleaepappus Cabrera, Bol. Soc. Argent. Bot. 11:273.1969. TYPE SPECIES: *Paleaepappus patagonicus* Cabrera, Bol. Soc. Argent. Bot. 11:273.1969. *Nardophyllum patagonicum* (Cabrera) Nesom, Phytologia 75:362. 1993. Fig. 1 E–H. TYPE: ARGENTINA. Chubut, Rio Chico, “Aut. 1900,” *Ameghino s.n* (HOLOTYPE: LP!)

Shrub densely branched, lateral branches sharp ended; leaves oblong to spatulate, coriaceous; capitula discoid, solitary at the ends of branches; involucre campanulate; receptacles paleaceous, paleae wide, apically pubescent, each enclosing a floret; cypselae terete, densely pubescent; pappi of 9–10 elliptic paleae 7 mm long, in 2 series.

Ecology.—*Paleaepappus patagonicus* inhabits semidesert areas in Patagonia. Knowledge of the ecology of *Paleaepappus* is scarce and speculative because the only record of this species is the type itself, and there is no ecological information on the label. The conservation status of this species could aptly be recorded as endangered.

Aylacophora and *Paleaepappus* are strongly segregated from *Nardophyllum* by characteristics of the elements of pappus such as number, shape, and number of series. The paleaceous pappus of *Aylacophora* and *Paleaepappus* contrast with the bristles in *Nardophyllum*. Intermediate states of pappus shape, like narrow paleae, have not been found in *Nardophyllum*, but occasionally, flat bristles have been found in *Nardophyllum*.

Nardophyllum circumscription

Nardophyllum Hook. & Arn. (1836) was described by Cabrera (1954) as shrubs densely branched, leaves alternate, small; heads solitary at the end of the branches; discoid capitula, involucre campanulate; receptacle small, convex, naked or with few paleae; cypselas turbinate, 4–5 ribbed, hairy; pappus composed of several bristles. The circumscription of *Nardophyllum* adopted here is the presented by Cabrera (1954) in his revision of the genus, where he included 7 species: *Nardophyllum armatum* (Wedd.) Reiche, *N. bracteolatum* Hauman, *N. genistioides* (Phil.) Gray, *N. bryoides* (Lam.) Cabrera, *N. chilotrichioides* (Remy) A. Gray, *N. lanatum* (Meyen) Cabrera, and *N. obtusifolium* Hook. & Arn.

Paleaepappus and **Nardophyllum**

Contrasting with the pappus of *Paleaepappus* (Fig. 1 H), the pappus of *Nardophyllum* is composed of ca. 30 bristles 5–10 mm long (Fig. 1 L), sometimes flattened, especially at the apex (Fig. 1 N), arranged in 2–3(–5) series.

Involucres and shape of *Paleaepappus* cypselae are similar to those of *Nardophyllum*. Differences in number and shape of receptacular paleae are also found in these two genera. *Paleaepappus* has paleaceous receptacles with wide and apically pubescent paleae enclosing each floret (Fig. 1 F). The receptacular paleae of *Nardophyllum* are narrow, do not enclose the florets (Fig. 1 J and M), and vary from absent (*N. armatum*) to 3-6 (rarely more numerous, 9-13 in *N. bracteolatum*).

Aylacophora and Nardophyllum

The pappus of *Aylacophora* (Fig. 1 C and 1 D) contrast highly with the pappus of *Nardophyllum* (see above). In addition, other characters distinguish *Aylacophora* from *Nardophyllum*: the involucre of *Aylacophora* is globose (Fig. 1 A); its cypselae are compressed, 2(-3), and pubescent only on the ribs (Fig. 1 C). The involucre of *Nardophyllum* is campanulate to obconical (Fig. 1 I) and the cypselas are terete, (4-)5-7(-8) nerved and uniformly pubescent (Fig. 1 K and 1 O).

Aylacophora has a paleaceous receptacle with wide and apically pubescent paleae enclosing each floret. The number and shape of receptacular paleae of *Aylacophora* (Fig. 1 B) contribute to set this taxon apart from *Nardophyllum*.

Aylacophora and *Paleaepappus* were placed in the *Chiliotrichum* group (Zhang & Bremer 1993; Bremer 1994) that includes shrubs with mostly densely set, coriaceous, and often abaxially tomentose leaves, and for most of the genera, paleate receptacles (Bremer 1994). Within this group there are intermediate morphotypes for pappus elements that range from terete bristles in *Chilliophyllum*, through narrow paleae in *Lepidophyllum* (Cabrera 1971), to paleae in *Aylacophora* and *Paleaepappus*. In addition, the number of receptacular paleae vary within the *Chiliotrichum* group. In reference to this character the variation observed within *Nardophyllum* is also present when comparing other genera of *Chiliotrichum* group, such as *Lepidophyllum* without paleae, *Chiliotrichum* with few paleae, and *Chiliophyllum* and *Chiliotrichiopsis* with fully paleate receptacles (Cabrera 1971, 1978). Because the gradation in pappus and receptacular paleae is inherent to the *Chiliotrichum* group itself, this variation cannot be an argument against the recognition of both *Aylacophora* and *Paleaepappus* as distinct from *Nardophyllum*.

Genera of *Chiliotrichum* Group (sensu Bremer 1994) can be identified as follows:

- 1. Capitulum without ray florets.
 - 2. Pappus of ca. 30 or more bristles arranged in 2-3(-5). _____ **Nardophyllum**
 - 2. Pappus of 10 or fewer paleae arranged in 1-2 series.
 - 3. Cypselas compressed, with hairs restricted to the ribs. _____ **Aylacophora**
 - 3. Cypselas terete, wholly pubescent. _____ **Paleaepappus**
- 1. Capitulum with ray florets.
 - 4. Receptacles epaleate.
 - 5. Ray corollas white or violet. _____ **Diplostephium**

- 5. Ray corollas yellow.
 - 6. Leaves opposite; pappus composed of a series of unequal paleaceous bristles. _____ **Lepidophyllum**
 - 6. Leaves alternate; pappus composed of 2 series of bristles. _____ **Parastrephia**
- 4. Receptacles paleate.
 - 7. Ray corollas white. _____ **Chiliotrichum**
 - 7. Ray corollas yellow.
 - 8. Pappus of terete bristles. _____ **Chiliophyllum**
 - 8. Pappus of linear, acute scales. _____ **Chiliotrichiopsis**

Nesom's reinstatement of *Nardophyllum scoparium* Philippi (Nesom 1993) is not accepted here. Presence of pistillate ligulate florets in the periphery (5–6) casts serious doubts about positioning this taxon inside *Nardophyllum*. The taxonomic placement of this Chilean species and its possible status as an undescribed genus allied to some genus inside *Chiliotrichum* group as Nesom suggests (pers. comm.) is being reviewed by one of us (JMB) and will be presented as a more comprehensive study of the *Chiliotrichum* group (in prep.).

According to Bremer (1994), *Aylacophora* and *Paleaepappus* are very similar and possibly sister groups. *Aylacophora* was related to *Nardophyllum* and *Chiliotrichiopsis* by Cabrera (1953); *Paleaepappus* was related to *Nardophyllum* and *Aylacophora* (Cabrera 1969). Our opinion, based on observations of cypselar morphology, number of series of the pappus elements, involucre shape, leaves shape and plant habit, favors a closer relationship between *Paleaepappus* and *Nardophyllum*.

Nesom (1993) suggest that the narrow, internally tomentose cauline sulcae of *Aylacophora* could be homologous with those found in some species of *Nardophyllum* and so denoting a closer relationship of *Aylacophora* to *Nardophyllum*. To complicate the matters further, the paleate receptacle of both *Aylacophora* and *Paleapapus*, would favor a closer relationship of these two genera with *Chiliotrichiopsis*, *Chiliophyllum* and *Chiliotrichum* instead, which are, as Nesom (1993) points out the closest relatives to *Nardophyllum* and all of them have a paleate receptacle (*Chiliotrichiopsis*, *Chiliophyllum* fully paleated, *Chiliotrichum* 15–21 paleae). Evidently, as Bremer (1994) states, the elucidation of the phylogenetic relationships among these genera demands a more comprehensive study of the *Chiliotrichum* group that is beyond the scope of this paper.

Segregation of *Aylacophora* and *Paleaepappus* from *Nardophyllum* on the basis of pappus shape is supported by other characters such as the shape of both cypselas and capitulum in *Aylacophora*, and the shape and quantity of receptacular paleae in both *Aylacophora* and *Paleaepappus*.

Although *Aylacophora* and *Paleaepappus* are closely related to the rest of *Nardophyllum* species, the discontinuities basically observed in the shape of the pappus elements, with no defined intermediate states, justify the consideration of both species as two distinct genera.

Our conclusion is supported by Nesom et al. (in press). These authors, based on features of the involucre and mainly on pappus morphology, have included

a new Peruvian species of Asteraceae: Astereae inside *Chiliotrichiopsis* Cabrera (*Chiliotrichiopsis peruviana* Nesom, Robinson & Granda). Nesom et al. (in press) found that the pappus morphology is a good character to separate genera inside *Chiliotrichum* group and concluded that Cabrera's narrow generic concept of *Nardophyllum* was a better description of the diversity inside *Chiliotrichum* group, therefore having independently arrived at the same conclusion we have, regarding the consideration of *Aylacophora* and *Paleaepappus* as distinct from *Nardophyllum*.

APPENDIX I

Additional specimens examined of ***Aylacophora deserticola*** Cabrera. **ARGENTINA.** Neuquén, Plaza Huinca, 11 Dec 1996, *H. Troiani et al.* 12503 (SRFA); Plaza Huinca, 11 Dec 1996, *H. Troiani et al.* 12504 (SRFA); Paso de Los Indios a Cutralcó, 5 Feb 1999, *P. Steibel y H. Troiani* 14074 (SRFA); Paso de las Bardas, 2 Feb 1999, *H. Troiani y P. Steibel* 13920 (SRFA). Paso de Los Indios, 5 Feb 1999, *P. Steibel y H. Troiani* 14069 (SRFA); Paso de Los Indios, 20 km hacia Cutralcó, 5 Feb 1999, *P. Steibel y H. Troiani* 14073 (SRFA).

Nardophyllum armatum (Wedd.) Reiche. **ARGENTINA. San Juan:** Iglesia, camino a el Fierro, Cañada de La Zorra, 24 Jan 1974, *Cabrera & al.* 24510 (LP); Pampa de Pauacán, entre las Aguaditas y Chepical, 12 Dec 1957, *Ruiz Leal* 18945 (LP). **La Rioja:** Gral. Sarmiento, Río del Oro, Cordillera, 7 Feb 1947, *Hunziker* 2197 (LP). **Catamarca:** Santa María, Campo Arenal, *Loerner* 8 (LP). **Salta:** San Antonio de los Cobres, 29 Jan 1944, *Cabrera* 8261 (LP). **Jujuy:** 1 km al W de la Quiaca, 11 Feb 1960, *Meyer & al.* 21291 (LP); Rinconada, Cusi Cusi, Mar 1970, *Fabris & Zuloaga* 7707 (LP); Humahuaca, Esquinas Blancas, 22 Ene 1966, *Cabrera & al.* 17726 (LP); Abra Pampa, Feb 1937, *Castellanos* 20229 (LP).

Nardophyllum bracteolatum Hauman. **ARGENTINA. Mendoza:** San Carlos, El Pedernal, 25 Mar 1916, *Sanzin* 1810 (LP); Tunuyán, Paso del Portillo, Cuesta de los Afligidos, 29 Jan 1934, *Ruiz Leal* 2052 (LP); San Carlos, Rincón de los Leones, 18 Jan 1941, *Ruiz Leal* 7212 (LP); San Carlos, Arroyo de la Qda. "Casa de Piedra," 17 Jan 1952, *Serra* 77 (LP).

Nardophyllum bryoides (Lam.) Cabrera. **CHILE. Magallanes:** Parque Nacional Torres del Paine, Lago Paine, 17 Jan 1999, *Bonifacino s.n.* (MVFA 28888). **ARGENTINA. Santa Cruz:** alrededores de El Chalten, 10 Feb 2000, *Bonifacino* 304 & *Romano* (MVFA); Guer-Aike, Est. Montedinerero, Cabo Vírgenes, Nov 1974, *Molina* 1 (LP); Río Gallegos, 5 Dec 1932, *Castellanos s.n.* (LP); Est. de las Vizcachas, Cerro de las Vizcachas, 17 Jan 1970, *Ruiz Leal* 27019 (LP); a 2 km de Guarumba, 16 Jan 1970, *Ruiz Leal* 27011 (LP); Lago Argentino, Parque Nacional Los Glaciares, Fitz Roy, 14 Feb 1975, *Cabrera & al.* 25864 (LP). Tierra del Fuego. Est. Cullen, 52° 44' S, 68° 33' W, 5 Jan 1972, *Moore & Goodall* 336 (LP); Bahía Lee. 52° 52' S 70° 16' W, 6 Nov 1971, *Moore* 2339 (LP).

Nardophyllum chiliotrichoides (Remy) A. Gray. **ARGENTINA. San Juan:** Calingasta, Qda. Los avestruces (oeste de Cerro Castaño), Feb 1960, *Fabris & Marchionni* 2354 (LP); Río Maurique a Portezuelo de Potrerillos, 23 Jan 1991, *Kiesling* 768 (SI). **Chubut:** a 20 km al E de Cushamen, 31 Dec 1947, *Soriano* 2786 (LP); Rawson, 12 km al S de Trelew, 7 Dec 1980, *Castroviejo & Lopez* 2313 (SI). **CHILE. Santiago:** Cordillera del Río San Francisco, Fierro Carrera, Jan 1925, *Werdermann* 621 (LP).

Nardophyllum lanatum (Meyen) Cabrera. **ARGENTINA. Mendoza:** Malargüe, ruta 40, 20 km al S de Calmuco, 1 Feb 1963, *Boelcke et al.* 10420 (SI). **Neuquén:** Laguna Copi Leuquen, al S de Calmuco, 15 Feb 1942, *Burkart & al.* 14425 (LP); Chos Malal, entre Río Barranca y Buta Ranquil, 8 Feb 1950, *Boelcke* 4235 (LP). **CHILE. Colchagua:** Termas del Flaco, 19 Feb 1966, *Zöllner* 833 (LP); Vegas del Flaco, al E de la Quebrada de los Ríos, falda SE del cerro, 7 Feb 1974, *Mahu* 9858 (LP). **Valparaíso:** Cerro Roble, Cordillera de la Costa, 6 Mar 1966, *Zöllner* 1402 (LP). **Ovalle:** *Geisse s.n.* (LP 60269).

Nardophyllum obtusifolium Hook. & Arn. **CHILE. Magallanes:** San Gregorio, 26 Oct 1968, *Cekalovic* 33903 (LP). **ARGENTINA. Santa Cruz:** Pto. San Julián, 1915, *Carete s/n* (LP); Corpen Aike, 20

km N Piedra Buena, Ruta 3, 3 Dec 1971, *Boelcke & al.* 15339 (LP); Pampa del Castillo, 11 Feb 1936, *Scott de Brirabén & Birabén* 17 (LP); Lago Bs. As., Los Antiguos camino a Pto. Moreno, 24 Nov 1965, *Correa & Nicora* 3638 (LP); Puerto Deseado, Jan 1896, *Alboff* 2169 (LP); Esquel, 2 Apr 1946, *Scolnik* 306 (LP); Leleque, 13 Jan 1947, *Soriano* 2341 (LP); Est. Pepita, Alto Río Senger, 13 Feb 1947, *Soriano* 2585 (LP). **Neuquén:** Charahuilla, Arroyo Lapa, Feb 13 1939, *Chicchi* 123 (LP); Laguna Blanca, 9 Jan 1966; camino a Ñirihuau, 16 Jan 1935, *Cabrera & Job* 353 (LP). **Santa Cruz:** Col. Carlos Pellegrini, Est. La Flora, Dec 1979, *Von Thüngen* 2 (LP).

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REFERENCES

- BREMER, K. 1994. Asteraceae: Cladistics and classification. Timber Press, Portland, Oregon.
- CABRERA, A.L. 1953. Un nuevo género de astereas de la República Argentina. Bol. Soc. Argent. Bot. 4:266–271.
- CABRERA, A.L. 1954. Las especies del género *Nardophyllum*. Notas Mus. La Plata, Bot. 83, 17:55–66.
- CABRERA, A.L. 1969. Compuestas nuevas de Patagonia. Bol. Soc. Argent. Bot. 11:273–275.
- CABRERA, A.L. 1971. Compositae. En M. N. Correa (ed.), Fl. Patagónica, Colecc. Ci. Inst. Nac. Technol. Agropecu. 8(7):1–451.
- CABRERA, A.L. 1978. Compositae. In: A.L. Cabrera, ed. Fl. Prov. Jujuy, Colecc. Ci. Inst. Nac. Technol. Agropecu. 13(10):1–726.
- CABRERA, A.L. and A. WILLINK. 1973. Biogeografía de América Latina. O.E.A. Serie de Biología, Monografía 13. Washington, D.C.
- GRAU, J. 1977. Astereae. Systematic Review. In: V.H. Heywood, J.B. Harborne, and B.L. Turner, eds. The biology and chemistry of the Compositae 2. Academic Press. London. Pp. 539–576.
- NESOM, G.L. 1993. Taxonomic status of *Nardophyllum scoparium* (Asteraceae: Astereae) with observations on the definition of *Nardophyllum*. Phytologia 75:358–365.
- NESOM, G.L., H. ROBINSON and A. GRANDA. A new species of *Chilotrichiopsis* (Asteraceae: Astereae) from Peru. Brittonia (in press).
- ZHANG, X. and K. BREMER. 1993. A cladistic analysis of the tribe Astereae (Asteraceae) with notes on their evolution and subtribal classification. Pl. Syst. Evol. 184:259–283.